

WHAT IS CLAIMED IS:

1. A method for manufacturing a GaN compound semiconductor element, comprising the steps of:

5 (a) forming, on a substrate, an N type GaN compound semiconductor layer and a GaN compound semiconductor layer which includes a P type impurity; and

(b) irradiating electromagnetic radiation of a predetermined wavelength onto said GaN compound semiconductor layer which includes  
10 a P type impurity.

2. A method according to claim 1, wherein said electromagnetic radiation of a predetermined wavelength is electromagnetic radiation having a wavelength that is selectively absorbed by the bonded  
15 structure of said P type impurity and H.

3. A method according to claim 1, wherein said step (b) is performed while heating the substrate.

20 4. A method according to claim 1, wherein said step (a) includes the steps of:

(a1) forming a buffer layer on said substrate;

(a2) forming an N type GaN compound semiconductor layer on said buffer layer; and

25 (a3) forming said GaN compound semiconductor layer which includes a P type impurity on said N type GaN compound semiconductor layer.

5. A method according to claim 1, wherein said step (a) includes

the steps of:

(a1) forming a buffer layer on said substrate;

(a2) forming said GaN compound semiconductor layer which includes a P type impurity on said buffer layer; and

(a3) forming said N type GaN compound semiconductor layer on said GaN compound semiconductor layer which includes a P type impurity.

6. A method according to claim 1, wherein said P type impurity is at least one of Mg, Zn, Cd, Be, and Ca.

7. A method according to claim 1, wherein light having a wavelength of  $4.5 \mu\text{m}$  is irradiated with an intensity of  $0.01 \text{ mW/mm}^2$  or greater at said step (b).

8. A method according to claim 1, wherein electromagnetic radiation having a frequency of  $2.45 \text{ GHz}$  is irradiated at an intensity of  $1 \text{ mW/cm}^2$  or greater at said step (b).

9. A method according to claim 1, wherein said N type GaN compound semiconductor layer is formed by doping an N type impurity to a GaN compound semiconductor.

10. A GaN compound semiconductor element comprising:

a substrate;

an N type GaN compound semiconductor layer formed on said substrate;

a P type GaN compound semiconductor layer formed on said substrate and adjacent to said N type GaN compound semiconductor

layer; wherein

said P type GaN compound semiconductor layer is formed by irradiating electromagnetic radiation of a predetermined wavelength onto a GaN compound semiconductor layer to which a P type impurity is doped.

11. An element according to claim 10, wherein said electromagnetic radiation of a predetermined wavelength is electromagnetic radiation having a wavelength that is selectively absorbed by the bonded structure of said P type impurity and H.

12. An element according to claim 11, wherein said electromagnetic radiation of a predetermined wavelength is light having a wavelength of 4.5  $\mu\text{m}$ .

13. An element according to claim 11, wherein said electromagnetic radiation of a predetermined wavelength is electromagnetic radiation having a frequency of 2.45 GHz.

14. An element according to claim 10, wherein said P type GaN compound semiconductor layer is formed by irradiating said electromagnetic radiation of a predetermined wavelength while heating the GaN compound semiconductor layer to which the P type impurity is doped.

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